Psychosurgery*

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PSYCHOSURGERY consists of operations on the brain for the relief of mental or physical suffering. Egas Moniz[1] started it in 1935 in the field of mental disorders, while Watts and Freeman[2] proved its value in pain cases some ten years later. In the intervening period there had been gradual development of psychosurgery both here and abroad, of necessity slowed by the war. In the past five years great strides have been made and many thousands of patients have secured relief from intolerable miseries both mental and physical. Yet psychosurgery can still be termed a recent development, recent in comparison with sympathectomy, chordotomy and other measures for the relief of pain, and approximately as old as insulin shock and electric shock therapy for mental disorders. Certain fundamentals have been laid down and other fields are rapidly being explored, so that psychosurgery can still be said to be in a state of development.

Attention has been concentrated first and foremost on the frontal lobes. Operations in other areas are ineffective, with the possible exception of resection of the post-central cortex in cases of painful phantom limb. Attempts have been made to relieve distress by operations on the temporal, parietal and occipital lobes, but without success. Of great theoretical importance has been the direct attack upon the thalamus by Spiegel and Wycis,[3] and more recently these authors have placed minute lesions in the hypothalamus. But these operations, important as they are from the theoretical standpoint, are still in the experimental stage. Until they are shown to be superior in results to simpler and more readily available technics, they will be tried out only in patients whose conditions are hopeless.

The frontal lobes, then, comprise the domain of psychosurgery. They may be attacked from above, as was done originally by Moniz, or from the side as preferred by Freeman and Watts,[4] or from below through the orbit, as originally described by Fiamberti[5] and later extended by myself.[6] Some understanding of the architecture of the frontal lobes is necessary in order to comprehend the rationale of the various psychosurgical procedures.

ANATOMY OF THE FRONTAL LOBE

The frontal lobe is bounded posteriorly by the rolandic fissure and below by the sylvian fissure. On its inferior aspect it merges with the olfactory trigone, while medially it is bounded by the callosomarginal sulcus. The posterior parts, both over the convexity and at the base are concerned largely with more primitive muscular and visceral activities, and have nothing definite to do with psychic functions. Indeed it is dangerous to trespass upon these areas because of resulting disabilities and early death. Without entering into the minutiae of architectural patterns, it may be said that the major portion of the frontal lobe is of quite uniform architecture, and that the extent of incisions is of greater importance than their exact location. The connections of the frontal lobe are of major importance. The pathway from the thalamus to the frontal lobe heads the list among these. When this pathway is severed, the cells in the medial nucleus of the thalamus disappear. There is a point-to-point relationship of the cells in the medial nucleus to the frontal lobe. The cells in the medial portion of the nucleus project to the orbital areas, while those in the lateral portion project to the convexity, and those in between run to the frontal pole.

Efferent connections from the frontal lobe run through the internal capsule and peduncle as far as the pons, but these fibers come mostly from the convexity, and little is known about their function. There appear to be only indirect connections with the basal ganglia, although some direct fibers from the basal frontal cortex to the hypothalamus have been demonstrated.

Connections of the frontal lobe with other cortical areas are found in the corpus callosum, the

* The Sixth Annual Charles Sumner Lecture of the Medico-Chirurgical Society of the District of Columbia, May 25, 1950.
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uncinate fasciculus, and in certain more obscure bundles such as the superior and inferior fronto-occipital fasciculi. None of these is of any known importance in psychosurgery. The important pathway is that which connects the thalamus with the frontal lobe.

It may thus be seen that psychosurgery operations are designed to sever more or less of this pathway, either at its source, as in thalamotomy, or in its course, as in lobotomy, or at its termination, as in topectomy, lobectomy, or cortical undercutting.

SURGICAL PROCEDURES

Frontal lobotomy is carried out mainly by two methods, the closed or precision method as developed by Watts and Freeman,[7] and the open method as originated by Lyerly[8] and adopted by most neurosurgeons.[9] These operations are carried out through burr holes or trephine openings close to the coronal suture, either above or laterally. In the open operation an incision is made through the cortex and the thalamofrontal radiation is severed by a blunt knife or leucotome or by means of a suction-cautery tip. A variable amount of the white matter is severed leading down toward the sphenoidal ridge, a convenient landmark. Careful sighting, followed by instillation of iodized oil into the incisions, with roentgenographic verification, characterizes the precision method. The mortality rate in either type of operation is about 3 per cent from hemorrhage or infection, so frontal lobotomy is a relatively safe procedure.

Topectomy requires a somewhat larger opening, either with a large trephine or a small osteoplastic flap, and the cortex of the frontal lobe is resected over symmetrical areas as carefully as possible. Pool[10] and his associates found that resection from the frontal pole, namely Areas 9, 10 and 46 gave better results than similar excisions from the base or the medial aspect.

Cortical undercutting is performed through similar openings in the skull, the difference being that the cortex is undercut rather than removed, thus sparing the blood supply to neighboring areas. Since the arteries run from the surface into the brain, bleeding is fairly easily controlled. The mortality reported by Pool and Scoville[11] is as low as in the lobotomy series, but in less experienced hands, it rises considerably. An additional and somewhat embarrassing sequel to any of these large open operations is the increased incidence of post-operative epilepsy.

Transorbital lobotomy has the virtue of simplicity, and can be carried out in patients who are poor risks. A sharp pointed instrument is driven through the orbital plate by way of the conjunctival sac and moved about so as to sever an important portion of the thalamo-frontal radiation. It is less precise as an operation and probably less effective in relieving severe states of mental disorder, although it seems to work well in pain cases. Operative fatalities in large series of cases run around one per cent and complications are rare. For instance, in my series of nearly 500 transorbital lobotomies there have been three fatal hemorrhages and two other deaths, no serious infections and only two instances of convulsions. This is the method of choice in hospitals where psychosurgery is undertaken.

PERSONALITY CHANGES

Personality changes seem to be largely a matter of quantity of frontal lobe disconnected. The farther back the cuts are made in lobotomy, or the larger the areas resected in topectomy or lobectomy, the more glaring these defects become. Extensive operations reduce the operated individual to a state of helplessness. Such an individual is lazy, rude, boisterous, restless and inane; he has none of the finer feelings and no desire to improve himself. He is relatively unteachable, having lost those social skills that are necessary for living outside an institution. More conservative operations leave the individual unprotected, as it were, from saying what comes into his mind without anticipating the effect his words may cause. The patient is pleasant and agreeable, but lacking in tact and reserve; he may be able to retain employment, but he does not use his spare time for self-development and for service to the community. Minimal operations leave the patient quite perfectly adjusted. The only observable defects are concerned with creative artistry and personal counselling. In minor degree these patients are lacking in that type of anxiety or drive or energy that makes a person go out of his way to achieve a higher type of satisfaction; call it the zeal of a crusader, or religious fervor, or spiritual self-consciousness. In certain respects, this loss is one

that disturbs the conscience of many doctors who contemplate the effects of psychosurgery, but it must be remembered that operations are not performed on normal people, but upon those who have already lost their creativeness through mental or physical disease and who are faced with disability or suicide. Indeed in many instances, creativeness has long been a thing of the past to these tormented individuals, demoralized and distressed as they are by their sickness.

The problem in psychosurgery is to produce just enough change in the individual to make for relief of symptoms without at the same time bringing about the undesirable immature or childish reactions such as are witnessed after extensive operation. At the same time it must be remembered that an inadequate operation is useless. Indeed, relapses occur at times after what were apparently brilliant results, and then the surgeon must run the risk of secondary operation with its manifold chances of personality down-grading. The fundamental principle, therefore, is to sacrifice just enough of the frontal lobes to make for effective living without return of symptoms.

CHOICE OF PATIENTS

Psychosurgery is symptomatic treatment. It is directed against suffering. Suffering is characteristic of many diseases running all the way from cancer to anxiety neurosis. If the suffering is so severe that the patient is disabled, and if no other treatment, or even the passage of time, allows reasonable hope of success in relieving the suffering, the psychosurgery offers a good chance of relief. I use the word suffering advisedly. Pain is hardly a good word, although many patients complain of pain. Suffering is more than pain, since it may be accompanied by no physical abnormality, but yet by an intolerable preoccupation. It is accompanied by an emotional reaction that absorbs the patient's whole attention, and renders him unapproachable as far as palliative measures are concerned. There must be suffering, however, in order for psychosurgery to achieve substantial results. There are many patients with various diseases, particularly mental diseases, in which the emotional component is burnt out. These people repeat their complaints in a sort of litany, but if there is no strong emotional component behind them, the operation is likely to be ineffective. We can recognize the emotional component in three categories: complaints, behavior and autonomic imbalance. If the complaints are clamorous, or the behavior violent, there is good chance of success. but even when these are absent, as in some cases of catatonia, good results may yet be achieved if the patient has a rapid pulse, dry tongue, blue hands and feet and so on.

Pain of whatever origin, if uncontrollable by other means, is a positive indication. This is nowhere more evident than in patients with recurrent cancer who have only death to look forward to. Lobotomy not only relieves the suffering (although the patient often describes the pain as unchanged) but permits the discontinuance of narcotics and gives the patient a certain serenity that is beneficial to all concerned, the patient, the family and the doctor. The problem in other painful conditions is somewhat more complex, because if the patient is relieved of his pain he may also be relieved of some of his personality restraints. Therefore, care must be exercised in cases of tabes, radiculitis, causalgia, phantom limb and the various neuralgias. Attempts have been made to relieve pain by unilateral lobotomies, but the pain almost always recurs as soon as the personality is established at its postoperative level. This matters less in patients who have but a few weeks to live, but secondary operations are often required. Since the personality of the patient with a painful condition is less disturbed than that of one with a mental condition, a conservative operation is desirable. The more the complaints are tinged with emotion, the more necessary it is to perform a bilateral operation.

There are certain contraindications to operation. In the first place, if milder measures will relieve the situation, psychosurgery is unnecessary. In the second place, if the personality is too deteriorated, operation is useless. In the third place, if the patient has previously demonstrated antisocial traits such as alcoholism, drug addiction (in the absence of pain), criminality, avoidance of responsibility, aggressiveness or psychopathic activities, the effect of operation may be to free him from any residual sense of guilt or shame, and thus turn loose upon society an individual whose behavior is intolerable. It thus requires sound clinical judgment to determine when the abnormal behavior is the consequence of disease, in which case it may

be restored to normal, and when it is a personality deviation that may be made even worse by operation. Finally, since psychosurgery produces gross lesions of the brain, the preceding occurrence of other organic lesions of the brain is almost a positive contraindication. Such patients are also nearly always made worse.

REHABILITATION

An important phase in psychosurgery is rehabilitation after operation. Depending upon the duration of the illness and its type and upon the extent of the operation, the patient has a longer or shorter road to health. After some of our radical operations the convalescent period is reckoned in terms of years rather than days. Surgical convalescence is a matter of days, but social convalescence in a patient who has been hospitalized in a mental institution for from five to ten years may take nearly as long.[12] Primary considerations are directed toward the regaining of the ordinary skills concerned in eating, bathing, control of the sphincters and so on. Along with this goes training in getting along with fellow patients or with the family. The patient is in a state of surgically induced childhood, and is apt to require the full time of one person particularly interested in him. A proper balance between simple tasks and simple amusements, with regularity in work and sleep, and with just sufficient pressure to accomplish results without leading to rage reactions, calls for skill in management. The person directing the rehabilitation has a great advantage because he knows what to expect, and can therefore keep one step ahead of the patient and not get excited if things don't get done as well as they would be by a normal person. The cultivation of a sense of responsibility is of paramount importance, and mere waiting upon the recovering patient with an attitude of "Let George do it" gets the patient into lazy habits that are inimical to effective social existence. A system of rewards and punishments often has to be worked out just as in the case of the growing child.

Sometimes in recovering patients there is persistence of some of the pains or of the distressing ideas. For the most part these represent echoes of the original disorder and will die out in the course of time. Medicines are required for certain conditions, phenobarbital for restlessness, dexedrine for inertia and for the control of the appetite, stilbestrol for ardent sexuality and ephedrine for incontinence. Some of the mental symptoms persisting after operation can be cleared up with insulin shock or electric shock. Convulsions, if they are to occur, usually do so within the first year, and require fairly heavy doses of dilantin and phenobarbital. Fortunately there is a definite tendency for the convulsions to come under control.

CONCLUSIONS

Psychosurgery has given us the means of relieving certain distressing and disabling conditions for which no other effective treatment exists. Whether the suffering is physical, as in cancer, or mental, as in severe anxiety states, the relief is often phenomenal.

Relief is gained at the cost of sacrifice of some of the highest human powers, so that psychosurgery should not be lightly undertaken. The patient chosen for operation should be faced with complete disability or suicide, in which case his highest human powers are no longer available for his use. Patients should be selected upon the basis of their emotional tension, excluding those who discharge their tensions through antisocial behavior, especially alcoholism and criminality.

Rehabilitation is a prolonged process in many patients and requires great personal devotion for best social results.

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